Colleague, Mentor, and Close Friend

Thomas Reed

Reed recounts an experience that has become, for many people here over the years, one of the benefits of working at the Lab: meeting a colleague who eventually becomes a mentor and a close friend.

I first met Jack Rosengren in March 1958 at a formal Phase I warhead feasibility study. I was an Air Force lieutenant, stationed at the Air Force Ballistic Missile Division in Los Angeles.

Jack was not much older than I. He had proceeded through the conventional physics apprenticeship: a Ph.D. from UC Berkeley, a stint teaching at MIT, and a brief tour through the aerospace industry. Harold Brown recruited Jack into Livermore's A (thermonuclear) Division in 1957. He was tall, thin, handsome, quiet, witty, and smart—all substance and no flash. Underlying that substance were core values of integrity and good judgment—traits that are nice to find in people dealing with nuclear weapons.

Jack Rosengren became my colleague, mentor, and close friend. He was the magnet that drew me to Livermore a year after I met him.

In 1956, Edward Teller had proposed a megaton device sufficiently light and compact that it could be practically used as the payload for the U.S. Navy's envisioned fleet of ballistic missile submarines. The Navy went out onto the Polaris limb in reliance on that promise, but its fulfillment within Livermore's A Division was clouded. Experiments during the summer of 1956 were interesting, but the nation's deterrent still awaited substantive results. In 1957, Rosengren was put in charge of A Division's efforts to produce the promised yield within the designated weight. Rosengren brought a sense of calm and order to the work. It began to pay off in 1958. The summer of 1958 brought genuine breakthroughs based on ingenious proposals by designers.

The program's remarkable achievements were demonstrated in spectacular fashion on May 6, 1962. The USS *Ethan Allen*, the sixth-launched Polaris submarine, fired a complete operational test of the Polaris A-1 missile system, culminating with the successful detonation of the Livermore-designed megaton-class warhead.

From left: Lawrence Germain, Robert Remillard, W. James Frank, Charles Aplin, Jack Rosengren, Kenneth Bandtel, Kenneth Ristad, Marvin Martin, Alex Julian, and Michael May.

"I Was the Goat"

Ed Fleming

Fleming flew through mushroom clouds to collect air samples during Operation Hardtack I in the Pacific in 1958.

One of the activities in the atmospheric testing days was flying B-57 Canberra aircraft through the mushroom clouds to gather radiochemical samples to do radiochemical diagnostics. The arrangement had evolved to the point where the Air Force had agreed that a scientist should be in the backseat of what was then called a sampler controller, to decide what portions of the cloud should be sampled and when the aircraft should penetrate. You had to balance these two conflicting requirements. You'd like to get in as soon as you could in order to get the hottest sample you could. On the other hand, you didn't want to overexpose the pilots. I began to participate as a sampler controller.

At the Operation Hardtack test in 1958, we were facing a moratorium deadline. It seemed as though the number of shots increased almost exponentially. In fact, we formulated a new law of physics. It was called the "Law of Conservation of Devices." No matter how many you shot, you always had three left. There were always three more to go. With so many tests still to be done before the testing moratorium was imposed, it was decided to try to shoot these shots after nightfall. Just imagine what position that puts the sampler controller in.

I was the goat, the guy who was the sampler controller who had to try to figure out how to do this. You can't see the clouds on the radar, and if you can't see the cloud, you don't know where to send the sampling aircraft. We were up there looking around for this cloud at 1:30 or 2:00 in the morning, and fortunately, on that particular night there was something like a half moon. The normal cirrus cloud situation provided lighting in such a way that if you were at almost exactly the right altitude, you could see the edge of this cloud. I sent aircraft in where I thought that cloud was, and what do you know! There was radioactivity there, and we were successful in sampling, but it was a touch-and-go situation.

Top: Ed Fleming.

Above: Bikini and Enewetak Atolls where Hardtack I took place in 1958.

Right: Makeshift potty on deck.